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Utilising synchronous web mediated communications as a booster to sense of community in a hybrid on-campus/off-campus teaching and learning environment.

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This paper examines the enabling effect of using synchronous internet mediated communication technologies to develop a Sense of Community (SOC) in a group of post graduate students consisting of a mix of on-campus and off campus students. The SOC is seen as an important constituent of a community of learners. An instrument was developed to measure SOC and the underlying dimensions of community identity, learning discourse and emotion. It is argued that a similar SOC is experienced by the on campus group and off campus group as a result of the synchronous events. It is further argued that both these groups developed a greater SOC than the control group.

Keywords: learning community, sense of community, synchronous internet mediated communication technologies

Background

The unit Professional Application of Research is a compulsory unit for masters and doctoral students studying with the Queensland University of Technology's Faculty of Education. This unit aims at developing knowledge of the various paradigms of research and the ability to read research reports critically. Traditionally students had a choice to undertake this unit in an internal weekly lecture/tutorial mode, off campus mode supported by external notes or through a one-week intensive block mode conducted during summer or winter vacations. However, depending on which lecturer was teaching the unit in the different modes, the students' pedagogical experiences and the focus on the content varied from one group of students to another. In particular, internal modes of offering employed pedagogies that allowed the development of student-student and student-lecturer collaboration and were successful in developing a sense of community within the unit – an outcome not easily achieved in the other two modes.

In the 2005 implementation of the unit, the three modes were combined in a single mode where all students shared the same pedagogical experiences based on equitable access to a website supporting the unit. This website contained lectures in the form of flash movies, supporting notes, resources and activities to support successful completion of the unit. Further, it provided off campus students with an opportunity to participate in real-time bi-weekly tutorials along with on-campus students. Off-campus students were able to connect via a chat room on the website and hear, see and participate in tutorial activities. They participated in the discussion by typing comments and questions that were projected in the physical classroom and allowed on-campus students to interact with off-campus students in real time. Lastly, just as in a face-to-face classroom, off-campus students could break up into small chat rooms to engage in an activity in-depth and return to the lobby of the chat room for reporting their deliberations at the same time as the on-campus students.

There were four pedagogical principles that underpinned this development: a desire to increase the autonomy of the learner; to encourage the creation of a community of learners; to build a supportive teaching and learning environment; and to maintain a rigorous approach in relation to discipline knowledge. Firstly, we sought pedagogical practices that were not based on a transmission model where the lecturer acted as the sole source of knowledge. By providing students with a range of web mediated resources, students had the opportunity to customise their own learning pathways based on their previous experience and current needs. Although the material was scaffolded on a week-by-week basis, the

existence of the all material on the web facilitated study at a pace appropriate to the students learning styles and circumstances.

Secondly, through the formation of Small Study Groups and the use of synchronous and asynchronous communication tools, students were provided with the opportunity to share their experiences, questions and concerns with each other. These opportunities were provided at two different levels within the structure of the website. The communication facilities in the Class Group Area (upper level) were monitored regularly by the lecturers who responded to students' questions and comments in a timely manner and in a whole class context. On the other hand, the communication mechanisms in the Small Study Group areas (asynchronous and synchronous) were not regularly monitored by staff and were intended for students to be able to discuss topics and concerns of interest to themselves. The development of the community of learners was also encouraged through the use of a combination of individual and group assessment tasks. The students had a chance to collaborate within their Small Study Groups on two occasions on group-developed tasks totalling 30% of the assessment load.

Thirdly, as a result of a long engagement in teaching this unit to a variety of student groups, we were aware of the need for appropriate scaffolding of the learning process. Similarly, we anticipated the utilisation of an unfamiliar website and innovative application of communications technology would necessitate additional student support. The Unit development team consisted of academics and university professional staff with a wide range of expertise that allowed for the anticipation of problems that students might have in their engagement with the Unit. It was recognized that timely and effective response to any problems that arose was essential. The bi-weekly tutorials were designed not so much as to present new material, but to provide an opportunity to deal with any conceptually difficult aspects of the unit content and to allow students to discuss concerns directly with teaching staff and fellow students.

Fourthly, in developing this Unit the depth and spread of the discipline knowledge required by the diverse student population were kept at the foreground of our deliberations. The content of the unit covered a range of theoretical and methodological topics necessary for critical engagement with published research. The content and the supporting material reflected the historical as well as the current debates in educational research. We took care not to allow the innovation in presentation to occur at the expense of any rigor in the development of the content. The content of the Unit also included the development of some technical skills considered advantageous for postgraduate studies. In particular, material to develop information literacy and academic writing was integrated within the week-by-week activities and addressed in some assessment items.

The Focus

The background described above embodies a range of interesting facets worthy of further elaboration and study. Space precludes dealing with them all. This paper will focus on a single issue albeit one that was central to the developmental philosophy. There was a strong desire by the teaching and development team to encourage the establishment of a community of learners within the unit. In particular we wanted to break down the feelings of isolation that had been expressed in the past by the off campus students. One of the mechanisms chosen to do this was the instigation of the on/off campus synchronous tutorials described previously.

The term 'community of learning' is taken from the work of social psychologist Lev Vygotsky and refers to the social institutions in which 'thinking occurs as much among and within individuals' (Cole and Engestrom cited in Bourne, 2003, p. 505). From this perspective, communities of learning, whether they take the form of a class of students working face-to-face with one teacher or a virtual classroom are crucial sites for the development of conceptual thinking. The class of students as a cohort moves together in their learning by listening and engaging with each other, as well as the teacher/instructor. The discourse of learning is thus generated by all members of the class or group, rather than just one individual learning alone. The principles of communication in a learning community are specifically oriented to 'induction into a system of knowledge' (Bourne, 2003, p. 509).

Some research has been undertaken on the forms of communication facilitated by virtual learning environments. Stromquist (2002, p. 126) reported on an evaluation of a virtual learning program at Kings College (London) in 1999-2000. The evaluation of the program 'focused on one element of the virtual

classroom: the interactive communication system that gives students the opportunity to communicate and discuss their courses asynchronously (at times of their own choosing).’ The findings of the evaluation revealed that most of the interactions ‘lacked sociolinguistic conventions to guide the initiation, development, and closure of group discussions’ (Stromquist, 2002, p. 126). The evaluators concluded that the learning community was fragmented and students felt isolated and confused because communication was generally ineffective.

It was findings such as Stromquist’s (2002) that prompted the development team to incorporate a synchronous communications component as well as an asynchronous communications component within the unit. The following discussion focuses on the effect of the synchronous on/off campus tutorials on the Sense of Community (SOC) experienced by the group.

Sense of community and learning

A constructivist view of learning places an emphasis on individual cognitive processes in the construction of knowledge (Kafai & Resnick, 1996). Jean Piaget was a champion of this model and placed great importance on how knowledge was internalized. Brook and Oliver (2003) contrast this strict constructivist view with the socio-cultural perspective which seeks to place a greater emphasis on the importance of social interaction in the knowledge building process. Even Piaget acknowledged that social experience was an important contributing factor to intellectual growth (Elkind, 1967).

Traditional pedagogies associated with supporting learning at a distance in tertiary based units were constrained by circumstances, to at best constructivist approach and at worst a transmission model. Learning experiences were packaged in a text environment and scaffolded in an attempt to assist students to internalize the concepts and processes which formed the basis of the unit. Little attempt was made to address the social component of the learning process.

Over recent years there have been many attempts to remedy this deficiency by utilizing internet mediated communication technologies to help establish learning networks (Rovai, 2002). Much of this work has centered on using asynchronous communication technologies (Hew & Cheung, 2003) such as e-mail, web discussion boards and forums as an enabling medium (Stacey & Rice, 2002). There has been less emphasis on the use of chat rooms as a formal pedagogical tool to enhance learning.

An important component of a learning network is an underlying sense of community (SOC) (Dueber & Misanchuk, 2001). The use of the term *community* in an educational context is common but the literal meaning of the concept is not well articulated. However, most commentators agree that the construct of SOC is multi-dimensional and the dimensions will map feelings of connectedness, communication, belonging and common purpose (Dueber & Misanchuk, 2001; Long & Perkins, 2003; Rovai, 2002). How the dimensions are operationalised will depend on the context and environment in which the community is formed. Operationalising the dimensions of an SOC for a learning network built in a “face to face” environment will differ to one supported by synchronous and/or asynchronous technologies. This will happen for a variety of reasons including differences in the way text and speech are processed, absence or otherwise of visual cueing and query response time expectation, to name a few.

Learning communities also differ in the way their boundaries are mapped (Wilson, Ludwig-Hardman, Thornam, & Dunlap, 2004). In an unbounded system acceptance into the community is based on some common interest or goal. A community of bush regenerators might be indicative of such a system. As long as a member is interested in learning or teaching about bush regeneration they will remain a member of the community. Once this is no longer their goal they will leave the community; the life span of the community is indeterminate and member participation dependent. In a bounded system community membership is activated by some external body and the life span of the community is likely to be predetermined. A community of learners within a tertiary unit of study is an excellent example of this.

The dynamics of a community are therefore likely to depend not only on the method of communication but also on the bounded or unbounded state of the system. The challenge for this project was to construct an instrument which would give a measure of SOC for a bounded, synchronous hybrid learning community. The system could be considered hybrid because of the simultaneous, synchronous interaction between off-campus and on-campus students and lecturing staff.

The instrument

The design considerations in the construction of the instrument included:

- defining a SOC space specific to the bounded, hybrid context described earlier;
- minimising the number of dimensions mapping the space;
- maximising orthogonality between the dimensions; and
- minimising the number of questions underpinning the dimensions without compromising construct or content validity.

The instrument consists of a survey of 12 questions that map to three underlying dimensions (4 questions per dimensions). The three dimensions were labeled: community identity, learning (through discourse) and emotional support. The questions were rated on a Likert scale 1 (strongly disagree), 2 (disagree), 3 (undecided), 4 (agree), 5 (strongly agree). An index was calculated for SOC overall and for each dimension. This was done by summing the score on each question and calculating the mean. While it is recognised a Likert scale is technically an ordinal scale which precludes the calculation of means, in this context it is treated as being of interval level of measurement which is line with common practice in educational research (Lehman, 1991).

Face validity was established through review by peers who were either experienced in on-line teaching and learning or were knowledgeable about learning communities or both. Construct validity is argued on the grounds that since the SOC space is mapped in an on-line and face to face hybrid context that the constructs should be able to be identified in a synthesis of the existing literature that describes SOC in an on-line learning context or in a face to face context. This was found to be the case (Dueber & Misanchuk, 2001; Long & Perkins, 2003; Rovai, 2002). Internal reliability was measured by calculating a cronbach alpha across questions for each dimension. The values for community identity, learning (through discourse) and emotional support were 0.82, 0.80 and 0.85 respectively. This compares well with the commonly accepted minimum level of 0.70 for cronbach alpha for short scales with five items or less (Gliem & Gliem, 2003; SPSS Inc., 1998).

Method

The instrument was administered to 71 postgraduate students undertaking an introductory unit in research methods as previously described. The response rate was 51%. This consisted of 13 students who attended all tutorials on line, 10 students who attended all tutorials face to face, 4 students who attend in mixed mode (sometimes on line sometimes face to face) and 9 students who did not attend any tutorials. For the purpose of this study the 4 students who attended in mixed mode were reallocated to either the face to face or on line groups based on which mode they employed most. In all cases the distinction was quite clear. The final categorization then became 15 on line, 12 face to face and 9 non attendees.

A quasi-experimental design was utilized with the non-attendees acting as the control group. It was expected the control group would still register positively on the SOC index as all students:

- were required to participate in two group work assignments collectively weighted 30% of the total assessment with most groups being a mix of on and off campus students;
- had access to asynchronous communications (e-mail lists, discussion boards) at the small study group, class and unit level; and
- had access to synchronous communications (chat room) at the small study group level.

The broad question therefore became: "Did the synchronous form of the tutorials contribute in an incremental way to the SOC experienced by those students who participated?"

In particular the following null hypotheses were tested across the three categories of participation in tutorials i.e. none, on and off campus attendance:

- There was no difference in the mean SOC index among the three categories.
- There was no difference in the mean score on each dimension of the SOC among the three categories.

Descriptives and box plots were used to initially explore these relationships. The hypotheses were then tested using a multi-variate analysis of variance (MANOVA) with level of significance predetermined at 0.05.

If there was no statistically significant difference indicated between the on and off campus students it was intended to increase the power of the test by relaxing the level of significance to help support the argument of no actual real difference in SOC experienced by these two categories.

Analysis of results

An analysis of the means and standard deviations of the SOC index and constituent dimensions displayed in table 1 might seem to indicate a small difference between the face to face and on line categories on these measures. There would appear to be a difference between no attendance and face to face and no attendance and on line on the same measures.

Table 1: Descriptives for SOC index and dimensions

	Category					
	none		face to face		online	
	Mean	SD	Mean	SD	Mean	SD
community ID	2.64	.84	4.04	.75	3.60	.57
learning discourse	2.97	.61	4.00	.61	3.73	.52
emotional dimension	2.92	.86	4.27	.52	3.85	.35
community index	2.84	.71	4.10	.54	3.73	.41

This impression is reinforced when the box plots (figures 1, 2, 3, 4) are examined.

Figure 1: Community identity across category

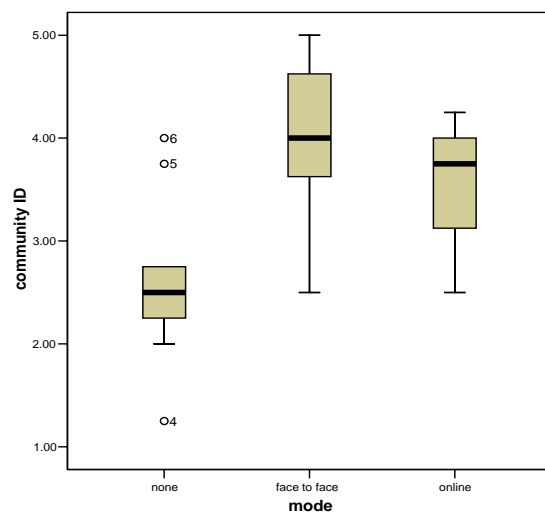


Figure 2: Learning discourse across category

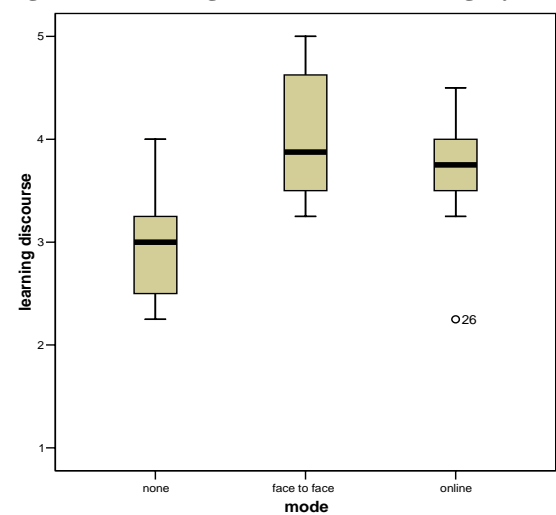


Figure 3: Emotional dimension across category

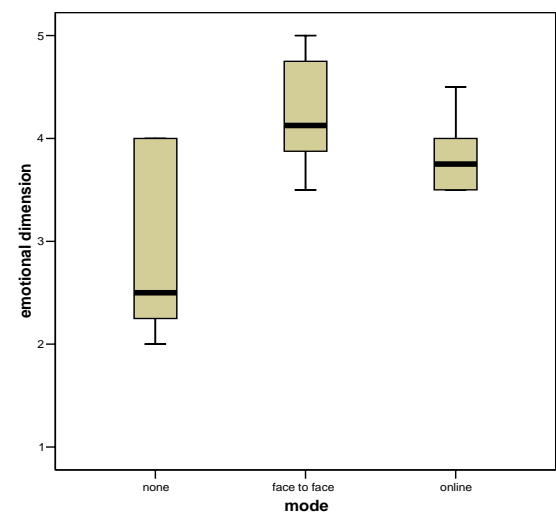
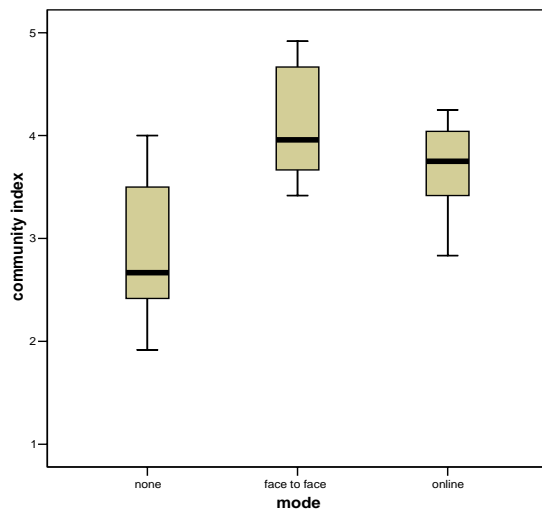


Figure 4: Community index across category



The observed differences were tested for significance ($p < 0.05$) by applying a MANOVA with category as the independent variable and the dimensions of the SOC as dependent variables.

Levene's test for equality of error variances was satisfied for the dimensions of community identity and learning discourse but not for the emotional dimension. Given the test was satisfied for the first two dimensions and that MANOVA is reasonably robust with respect to small divergences from homogeneity of variance across a dependent factor (SPSS Inc., 1998) it was considered appropriate to proceed with the analysis.

The multivariate analysis of variance showed that the effect of category on the SOC index was significant, Hotelling's trace $F(6, 60) = 4.94$, $p = 0.000$. Post hoc analyses using the Least Significant Difference (LSD) criterion for significance indicated that the mean community ID, learning discourse and emotional dimension was significantly lower in the none attendee category ($M = 2.64$, $SD = 0.84$; $M = 2.97$, $SD = 0.61$; $M = 2.92$, $SD = 0.86$) as compared to the face to face ($M = 4.04$, $SD = 0.75$, $p = 0.000$; $M = 4.00$, $SD = 0.61$, $p = 0.000$; $M = 4.27$, $SD = 0.52$, $p = 0.000$) and on line categories ($M = 3.6$, $SD = 0.57$, $p = 0.003$; $M = 3.73$, $SD = 0.52$, $p = 0.003$; $M = 3.85$, $SD = 0.41$, $p = 0.000$).

There was no significant difference between the on line and face to face group on any of the dimensions. This could be considered an important observation and one might be tempted to conclude that the SOC experienced by the online group was the same or similar to the face to face group. The logic of hypothesis testing precludes interpreting a non significant difference as no real difference. However if sufficient statistical power can be demonstrated then the likelihood of committing a type II error is minimized i.e. retaining the null hypothesis when it should be rejected.

To support the case for no real difference in SOC between the on line group and the face to face group a one way ANOVA was conducted between the groups using the SOC index as the dependent variable. The power of this test was increased by relaxing the level of significance from 0.05 to 0.10 delivering a power coefficient of 0.99 i.e. there would be a 99% chance of detecting a difference if a real difference existed. The analysis of variance showed that the effect of category on the SOC index was significant, $F(2, 3) = 5.94$, $p = 0.000$. Post hoc analyses using the Tukey HSD criterion for significance indicated that the mean SOC index was significantly lower in the non attendee category ($M = 2.84$, $SD = 0.71$) than in the online ($M = 3.73$, $SD = 0.41$, $p = 0.001$) or the face to face ($M = 4.10$, $SD = 0.54$, $p = 0.000$) categories.

No significant difference was detected on the SOC index between the face to face and on line groups despite the high level of power associated with the test. This non difference was further illustrated by generating Tukey homogenous sub-sets (Table 2) which attempts to combine non significant groups together. Non attendees were shown to form a single subset while on line and face to face categories were

combined into a second single sub-set. Given the results of this analysis it is reasonable to argue that there is little difference between the on line group and the face to face group with respect to SOC.

Table 2: Homogenous subsets SOC index

Tukey HSD	Subset for alpha = .1	
category	1	2
none	2.8426	
online		3.7278
face to face		4.1042
Sig.	1.000	.230

Conclusion

The instrument developed to measure SOC in a bounded, synchronous hybrid learning community would appear to be valid and reliable in this limited context. It would also appear to be sensitive enough to differentiate between the level of SOC experienced by a control group who did not participate in the learning community bounded by the tutorials and those who did. Further validation of the instrument is intended using larger data sets.

The mean community ID, learning discourse, emotional dimension and SOC index was significantly lower in the none attendee category as compared to the face to face and on line categories. It could be argued that the learning experience of students was enhanced by participation in the combined off/on campus tutorials. Further there would appear to be no difference between the on line and face to face group on the same dimensions. This could be considered an important observation and one could conclude that the SOC experienced by the online group was the same or similar to the face to face group as a direct result of participation in the on/off campus tutorials.

While the analysis presented is quantitative in nature, qualitative data was also collected and a preliminary analysis would suggest support for the above claims. An analysis of the synthesis of the quantitative and qualitative data will be the focus of a future paper.

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